

The opinion in support of the decision being entered today was **not** written  
for publication and is **not** binding precedent of the Board.

**MAILED**

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UNITED STATES PATENT AND TRADEMARK OFFICE

PAT. & T.M. OFFICE  
BOARD OF PATENT APPEALS  
AND INTERFERENCES

BEFORE THE BOARD OF PATENT APPEALS  
AND INTERFERENCES

Ex parte

MICHAEL M. THACKERAY,  
ROSALIND J. GUMMOW,  
and ERNEST E. FERG

Appeal No. 1998-2269  
Application No. 08/206,792

**ON BRIEF**

Before WALTZ, LIEBERMAN, and MOORE, Administrative Patent Judges.

LIEBERMAN, Administrative Patent Judge.

### **DECISION ON APPEAL**

This is an appeal under 35 U.S.C. § 134 from the refusal of the examiner to allow claims 1 and 3 through 20 which are all the claims pending in this application.

## THE INVENTION

The invention is directed to an electrochemical cell comprising an anode, a cathode and an ionically conductive electrolyte wherein at least part of the anode is a lithium transition metal oxide having a spinel framework. At least part of the cathode is a lithium metal oxide compound. Certain specified electrochemical characteristics are required upon discharge of the cell. Additional limitations are provided in the following illustrative claim.

## THE CLAIMS

Claim 1 is illustrative of appellants' invention and is reproduced below.

1. An electrochemical cell, which comprises

as at least part of an anode, a lithium transition metal oxide compound which has a  $[B_2]X_4^{n-}$  spinel-type framework structure of an  $A[B_2]X_4$  spinel wherein A and B comprise metal cations selected from the group consisting of Li, Ti, V, Mn, Fe and Co with the proviso that at least one of A and B comprises Li and at least one of A and B comprises Ti, V, Mn Fe and/or Co, X is oxygen (O), and n- refers to the overall charge of the structural unit  $[B_2]X_4$  of the framework structure, and the transition metal cation of which in the fully discharged state of the cell has a mean oxidation state greater than + 3 for Ti, + 3 for V, + 3.5 for Mn, + 2 for Fe and + 2 for Co;

as at least part of a cathode, a lithium metal oxide compound; and

an electrically insulative, lithium containing, liquid or polymeric ionically conductive electrolyte between the anode and the cathode, such that, on discharging the cell, lithium ions are extracted from the spinel-type framework structure of the anode, with the oxidation state of the metal ions of the anode thereby increasing, while a concomitant insertion of lithium ions into the compound of the cathode takes place, with the oxidation state of the metal ions of the cathode decreasing correspondingly.

### **THE REFERENCES OF RECORD**

As evidence of obviousness, the examiner relies upon the following references.

|                             |           |               |
|-----------------------------|-----------|---------------|
| Thackeray et al. ('371)     | 4,507,371 | Mar. 26, 1985 |
| Thackeray et al. ('877)     | 5,316,877 | May, 31, 1994 |
| (Filing date Aug. 27, 1993) |           |               |

### **THE REJECTIONS**

Claims 1, 3 through 4, 7 through 15, and 18 through 20 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Thackeray '371.

Claims 1, and 3 through 20 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Thackeray '371 in view of Thackeray '877.

### **OPINION**

We have carefully considered all of the arguments advanced by the appellants and the examiner and agree with the examiner essentially for the reasons set forth in the Answer that the rejections of claims 1 and 3 through 20 under § 103(a) are well founded. Accordingly, we affirm these rejections.

As an initial matter, it is the appellants' position that claims 5, 6, 16 and 17 over the '371 patent will not be affected by the arguments relating to the rejection of the remaining claims. See Brief, page 3. However, inasmuch as each of the rejections of record remaining before us include a rejection over claim 1 and none of the remaining claims are separately argued, we decide this appeal on the basis of claim 1 and limit our consideration

thereto. See 37 CFR § 1.192(c)(7) (1996).

We find that Thackeray '371 is directed to an electrochemical cell having an anode, a cathode and electrolyte. See column 1, lines 7-9. We find that each of the anode and cathode comprise a component having a cubic closed packed structure of the formula  $(B_2)X_4^n$  which is the structural unit of a spinel. See column 1, lines 18-20 and column 3, lines 14-19. Accordingly, we conclude that each of the anode and cathode have spinel structures. Our position is further supported by the specific anode and cathode materials disclosed at column 6, lines 1-20, which exemplifies at least one of the transition metals required by A or B of the spinel structure. See also claim 1 which requires that each of the anode and cathode have a spinel structure. In that respect we interpret the term, "lithium anode" at column 3, line 20, as reading on a lithium anode spinel structure and not a lithium metal anode as suggested by the appellants. We conclude that such a construction would be contrary to the disclosure of the Thackeray '371 when read as a whole.

We further find that a lithium cathode is exemplified by  $LiMn_2O_4$ . See column 3, line 22. We observe that this falls within the cathode materials disclosed in the specification at page 7, lines 20-22, when  $X = 1$ . We further find that a disclosed electrolyte may be  $LiBF_4$  in propylene carbonate. See column 5, lines 10-16. We observe that this electrolyte falls within the scope of electrolytes disclosed in the specification at page 9, lines 15-17. We find that the mobile cations of the solid electrolyte are preferably lithium ions. See column 5, lines 7-9.

As for the discharge characteristics required by the claimed subject matter, we find Thackeray '371 teaches that "[d]uring discharge of the cell M cations are released from the host framework structure of the anode into the electrolyte with a simultaneous oxidation of B-type cations in the anode framework structure. At cathodes of the formula  $(B_2)X_4^n^-$  as described above, during discharge of the cell M cations from the electrolyte enter the host framework structure of the cathode with a simultaneous reduction of a B-type cation of the cathode. The reverse processes can occur on charging the cell." See column 5, lines 38-47. In conjunction with our previous findings that M is preferably lithium and the anode has a spinel structure, which interpretation is further supported by the sentences quoted immediately above which require a spinel structure for both anode and cathode, we conclude that the physical characteristics required in the last 6 lines of the claimed structure are disclosed by Thackeray '371.

Based upon the above findings and analysis, we conclude that the examiner has established a prima facie case of obviousness with respect to the claimed subject matter.

As to the rejection of the claims over Thackeray '371 in view of Thackeray '877, inasmuch as the appellants fail to separately argue any of the dependent claims, we summarily affirm the rejection. We add only that the anode of claim 5 having the ideal spinel notation of  $LiTi_2O_4$  is disclosed by Thackeray '371 at column 6, line 8 wherein  $X = 1$ .

The appellants argue that the rejection, "based on the '371 patent amount to a

'picking and choosing' of certain parts of the reference while ignoring other aspects of it."

See Brief, page 9. While we acknowledge that Thackeray '371 discloses numerous combinations of electrochemical cells, the fact that a patent discloses other effective combinations, does not render any particular formulation less obvious. We find this particularly true because the claimed subject matter is used for the identical purpose taught by the prior art, i.e., preferably lithium based electrochemical cells. See Merck & Co. v. Biocraft Labs., Inc., 874 F.2d 804, 807-08, 10 USPQ2d 1843, 1846 (Fed. Cir.), cert. denied, 493 U.S. 975 (1989). Furthermore, in a § 103 inquiry, the teaching of a preferred specific embodiment is not controlling since the disclosure of the entire prior art including the non-preferred embodiments must be considered. Id. Accordingly, we conclude that it would have been obvious to the person having ordinary skill in the art to have utilized the disclosure of Thackeray '371 for the preparation of the claimed electrochemical cell.

Finally, the appellants argue that the '371 "does not teach a cell operating in 'rocking chair' fashion." See Brief, page 9. As we discussed supra, to the extent the claimed subject matter requires specific limitations directed to the discharge of the cell, we concluded that Thackeray '371 disclosed each of those limitations. As to the term "rocking chair" it does not appear in the claimed subject matter and needs no further discussion.

**DECISION**

The rejection of claims 1, 3 through 4, 7 through 15, and 18 through 20 under 35 U.S.C. § 103(a) as being unpatentable over Thackeray '371 is affirmed.

The rejection of claims 1 and 3 through 20 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Thackeray '371 in view of Thackeray '377 is affirmed.

The decision of the examiner is affirmed.

No time period for taking any subsequent action in connection with this appeal may be extended under 37 CFR § 1.136(a).

**AFFIRMED**

Thomas A. Wally

**THOMAS A. WALTZ**  
Administrative Patent Judge

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*Paul Lieberman*  
**PAUL LIEBERMAN**  
Administrative Patent Judge

## **ADMINISTRATIVE PATENT JUDGE**

) BOARD OF PATENT  
 ) APPEALS  
 ) AND  
 ) INTERFERENCES

  
**JAMES T. MOORE**  
Administrative Patent

**JAMES T. MOORE**  
Administrative Patent Judge

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PL/Ip

Appeal No. 1998-2269  
Application No. 08/206,792

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**DESIGNATION OF PANEL**

Pursuant to (1) the Commissioner's authority to designate the members of the Board of Patent Appeals and Interferences to hear cases before the Board (35 U.S.C. 7(b)), and (2) Commissioner Lehman's memorandum dated May 1, 1994 (delegating to the Chief Administrative Patent Judge the responsibility of designating members to hear cases before the Board), it is ORDERED that the panel of the Board of Patent Appeals and Interferences designated to hear this case shall consist of the following members of the Board:

On Brief     Heard     Redesignation     Expanded Panel,  
see addendum.

1. Judge Lieberman

2. Judge Wolz

3. Judge Moore

Bruce H. Stoner, Jr.

BRUCE H. STONER, JR.

Chief Administrative Patent Judge